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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/976,559	10/12/2001	Pradip Mitra	10919/25501	1434
29937	7590	02/18/2004	EXAMINER	
SIDLEY AUSTIN BROWN & WOOD LLP 717 NORTH HARWOOD SUITE 3400 DALLAS, TX 75201			LEE, SHUN K	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 02/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/976,559

Applicant(s)

MITRA, PRADIP

Examiner

Shun Lee

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 101201. 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "25" has been used to designate both gold layer and via. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
2. The drawings are also objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 32, 34, 36, 38, 40, and 42. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

4. The abstract of the disclosure is objected to because of the language, the length, and it is not a single paragraph. Correction is required. See MPEP § 608.01(b).

Claim Objections

5. Claims 3 and 52 are objected to because of the following informalities:
- (a) in claim 3, "Cd_{0.944}" on line 2 should probably be --Cd_{0.944}--; and
 - (b) in claim 52, "Hg_{1-x}(Cd_{0.944}Zn_{0.056})_xTe" on line 2 should probably be --Hg_{1-x}(Cd_{0.944}Zn_{0.056})_xTe.-- (i.e., each claim begins with a capital letter and ends with a period; see MPEP § 608.01(m)).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:
- The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
7. Claims 28-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 28 recites the limitation "the junction layer" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 28, 29, 31, 32, 41, 42, and 44-46 are rejected under 35 U.S.C. 102(b) as being anticipated by Cockrum *et al.* (US 4,956,304).

In regard to claim **41**, Cockrum *et al.* disclose (Fig. 1) a radiation detector comprising:

- (a) a substrate (is inherent in an epitaxially grown radiation absorption layer 12; column 2, line 68 to column 3, line 4);
- (b) a radiation absorption layer (12) above the substrate;
- (c) a passivation layer (18) above the radiation absorption layer (12);
- (d) a doped region (14) extending through the passivation layer (18) into the radiation absorption layer (12); and
- (e) an electrical contact (20) to provide electrical contact to the doped region (14).

In regard to claim **42** which is dependent on claim 41, Cockrum *et al.* also disclose (column 2, line 68 to column 3, line 4) that the absorption layer (12) includes HgCdTe.

In regard to claim **44** which is dependent on claim 41, Cockrum *et al.* also disclose (column 6, lines 56-62) that a dopant of the doped region is p-type.

In regard to claim **45** which is dependent on claim 41, Cockrum *et al.* also disclose (column 6, lines 56-62) that a dopant of the doped region is arsenic.

In regard to claim **46** which is dependent on claim 41, Cockrum *et al.* also disclose (column 2, line 68 to column 3, line 4) that the radiation absorption layer (12) is adapted to detect infrared radiation.

In regard to claims **28, 29, 31, and 32** in so far as understood, Cockrum *et al.* is applied as in claims 41, 42, 44, and 45 above. Cockrum *et al.* also disclose (column 6, lines 15-62) driving dopant from a patterned doping layer into the radiation absorption layer to form a doped region and patterning the passivation layer to expose the doped region.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1, 2, 4, 5, 14, 15, and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cockrum *et al.* (US 4,956,304) in view of Rosbeck *et al.* (US 4,961,098).

In regard to claims **1, 2, 4, and 5**, Cockrum *et al.* is applied as in claims 28, 29, 31, and 32 above. The method of Cockrum *et al.* lacks forming a wider bandgap layer between the radiation absorption layer and the passivation layer. However, compositional grading is well known in the art. For example, Rosbeck *et al.* teach (column 3, line 54 to column 4, line 4) that compositional grading (*i.e.*, a plurality of layers wherein bandgap for each layer changes) provides the advantage of reduced leakage current and increased diode impedance as compared with a constant bandgap layer. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to compositionally grade the absorption layer (12) in the method of

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Cockrum *et al.* by forming a wider bandgap layer between the radiation absorption layer and the passivation layer, in order to reduce leakage current and increase diode impedance.

In regard to claims **14**, **15**, and **17-19**, Cockrum *et al.* in view of Rosbeck *et al.* is applied as in claims 1, 2, 4, 5, and 46 above.

12. Claims 30, 33, 35-40, 43, 47, and 49-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cockrum *et al.* (US 4,956,304) in view of Mitra (US 5,998,235).

In regard to claim **30** (which is dependent on claim 28 in so far as understood) and claim **43** (which is dependent on claim 41), the method and detector of Cockrum *et al.* lacks that the absorption layer includes $\text{Hg}_{1-x}(\text{Cd}_{0.944}\text{Zn}_{0.056})_x\text{Te}$. Mitra teaches (column 3, line 54 to column 4, line 10) that an absorption layer comprising $\text{Hg}_{1-x}(\text{Cd}_{0.944}\text{Zn}_{0.056})_x\text{Te}$ have a infrared response equivalent to HgCdTe but with the advantage of reducing defects. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide $\text{Hg}_{1-x}(\text{Cd}_{0.944}\text{Zn}_{0.056})_x\text{Te}$ for the absorption layer (12) in the method and detector of Cockrum *et al.*, in order to reduce defects.

In regard to claims **33**, **35-37**, **39**, and **40**, Cockrum *et al.* is applied as in claims 28, 29, 31, and 32 above. The method of Cockrum *et al.* lacks that the absorption layer and the passivation layer are formed in situ by alternating layers of a first material (*i.e.*, HgTe) and a second material which is $\text{Cd}_{1-y}\text{Zn}_y\text{Te}$, where y (*e.g.*, $y=0.056$) is selected to provide a target lattice constant, the composition of the absorption layer and the passivation layer being determined by the relative thicknesses of the layers of the first

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and second materials and, after deposition of the layers of first and second materials, annealing the first and second materials to produce an alloy of the first and second materials. Mitra teaches (column 3, line 54 to column 4, line 16) that a layer formed from annealing alternating HgTe and $\text{Hg}_{1-x}(\text{Cd}_{0.944}\text{Zn}_{0.056})_x\text{Te}$ layers have the advantage reduced defects within the layer. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to anneal alternating HgTe and $\text{Hg}_{1-x}(\text{Cd}_{0.944}\text{Zn}_{0.056})_x\text{Te}$ layers to form the absorption layer (12) and the passivation layer (18) in the method of Cockrum *et al.*, in order to reduce defects.

In regard to claim **47**, **49-51**, **53**, and **54**, Cockrum *et al.* is applied as in claims 33, 35-37, 39, and 40 above.

In regard to claim **38** (which is dependent on claim 33) and claim **52** (which is dependent on claim 47), Mitra is applied as in claims 30 and 43 above.

13. Claims 3 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cockrum *et al.* (US 4,956,304) in view of Rosbeck *et al.* (US 4,961,098) as applied to claims 1 and 14 above, and further in view of Mitra (US 5,998,235).

In regard to claim **3** (which is dependent on claim 1) and claim **16** (which is dependent on claim 14), Mitra is applied as in claims 30 and 43 above.

14. Claims 6, 8-13, 20, and 22-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cockrum *et al.* (US 4,956,304) in view of Rosbeck *et al.* (US 4,961,098) and Mitra (US 5,998,235).

In regard to claims **6, 8-10, 12, and 13**, Cockrum *et al.* in view of Rosbeck *et al.* is applied as in claims 1, 2, 4, and 5 above and Mitra is applied as in claims 33, 35-37, 39, and 40 above.

In regard to claims **20, 22-24, 26, and 27**, Cockrum *et al.* in view of Rosbeck *et al.* and Mitra is applied as in claims 6, 8-10, 12, and 13 above.

In regard to claim **11** (which is dependent on claim 6) and claim **25** (which is dependent on claim 20), Mitra is applied as in claims 30 and 43 above.

15. Claims 33, 34, 37, 39, 40, 47, 48, 51, 53, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cockrum *et al.* (US 4,956,304) in view of Irvine *et al.* (US 4,566,918).

In regard to claims **33, 34, 37, 39, and 40**, Cockrum *et al.* is applied as in claims 28, 29, 31, and 32 above. The method of Cockrum *et al.* lacks that the absorption layer and the passivation layer are formed in situ by alternating layers of a first material (*i.e.*, HgTe) and a second material (*i.e.*, CdTe), the composition of the absorption layer and the passivation layer being determined by the relative thicknesses of the layers of the first and second materials and, after deposition of the layers of first and second materials, annealing the first and second materials to produce an alloy of the first and second materials. Irvine *et al.* teach (column 2, lines 50-59; column 3, lines 34-44) that a layer formed from annealing alternating HgTe and CdTe layers have the advantage controlling the lateral uniformity of x. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to anneal alternating HgTe and

CdTe layers to form the absorption layer (12) and the passivation layer (18) in the method of Cockrum *et al.*, in order to control the lateral uniformity of x.

In regard to claim **47, 48, 51, 53, and 54**, Cockrum *et al.* is applied as in claims 33, 34, 37, 39, and 40 above.

16. Claims 6, 7, 10, 12, 13, 20, 21, 24, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cockrum *et al.* (US 4,956,304) in view of Rosbeck *et al.* (US 4,961,098) and Irvine *et al.* (US 4,566,918).

In regard to claims **6, 7, 10, 12, and 13**, Cockrum *et al.* in view of Rosbeck *et al.* is applied as in claims 1, 2, 4, and 5 above and Irvine *et al.* is applied as in claims 33, 34, 37, 39, and 40 above.

In regard to claims **20, 21, 24, 26, and 27**, Cockrum *et al.* in view of Rosbeck *et al.* and Irvine *et al.* is applied as in claims 6, 7, 10, 12, and 13 above.

Conclusion

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

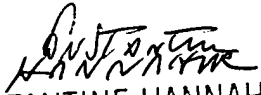
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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CONSTANTINE HANNAHER
PRIMARY EXAMINER
GROUP ART UNIT 2878